



REMOTE CONTROL DEVICE FOR RECORDING/REPRODUCING APPARATUS AND  
VIDEO SIGNAL RECORDING/REPRODUCING APPARATUS

BACKGROUND OF THE INVENTION

Field of the Invention:

The present invention relates to a remote control device for a recording/reproducing apparatus and a video signal recording/reproducing apparatus for use in recording and reproducing broadcast, and more particularly to that one using a hard disk or an optical disk as a recording medium.

Description of the Related Art:

Generally, A recording/reproducing apparatus using a video tape is well known. The recording/reproducing apparatus using a video tape, however, are impossible to freely perform reproduction while performing recording in a time sharing way by instantly switching between the recording and reproducing.

Recording devices by a personal computer using a general hard disk and such software are on the market. They are, however, not recording/reproducing devices for the exclusive use, and therefore they cannot perform simultaneous recording and reproducing.

Since a man-machine interface premised on the simultaneous recording and reproducing is not adopted there due to the above apparatus being unable to simultaneously record and reproduce, the conventional tube face displays and switching operation for setting cannot provide an optimum operational environment for recording/reproducing devices capable of

simultaneous recording and reproducing.

The conventional video recording/reproducing apparatus cannot perform simultaneous recording and reproducing. Assuming that this simultaneous recording and reproducing is possible, for example, considering that all the recorded video signals are to be reproduced, a video signal that is being recorded must be also reproduced. Heretofore, such a playback has not been considered.

In the simultaneous recording and reproducing, since the position or the time of the final image of a video signal is not clear, the last one of the recorded images cannot be recognized and the procedure for reproducing the next video signal to be reproduced cannot be taken. Therefore, it is impossible to program reproduction of the next reproduced image after completion of the playback of the video signal being recorded.

#### SUMMARY OF THE INVENTION

The present invention aims to provide a video recording/reproducing apparatus capable of simultaneously recording and reproducing video signals, which has been impossible with the conventional video recording/reproducing apparatus. More particularly, the present invention aims to provide a video recording/reproducing apparatus capable of simultaneous recording and reproducing, in which a playback of another video signal can be resumed while reproducing a video signal under simultaneous recording and reproducing and at

completion of the reproducing thereof.

Further, since there are recording display and playback display on the same tube face, it is difficult to discriminate the recording and the playback at first sight.

Since the conventional video recording/reproducing apparatus and remote control device (remote control) doesn't adopt an optimum structure and optimum arrangement and display of switches, for a video recording/reproducing apparatus capable of simultaneous recording and reproducing by means of a hard disk or an optical disk, there is a possibility of stopping the recording of an image by mistake when stopping the playback of an image being recorded.

The present invention aims to provide a man-machine interface improved in display on tube face and switching operation for recording and reproducing, better than the conventional video recording/reproducing apparatus as mentioned above.

Assuming that simultaneous recording and reproducing are possible and displayed on the same tube face, the conventional recording/reproducing apparatus will show the recording and reproducing display on the same tube face, which makes it difficult to distinguish at first sight between the recording display and the reproducing display.

Further, the conventional recording/reproducing apparatus and remote controlling device (remote control) are not optimally structured for a recording/reproducing apparatus capable of simultaneous recording and reproducing by using a

hard disk or an optical disk and lack an optimum arrangement and display of switches. Therefore, there is a possibility of stopping recording pictures by mistake when stopping playback of video being reproduced.

An object of the present invention is to provide a man-machine interface related to the display on a tube face which is yet to be provided and switching operation for recording and playback, etc., better than the conventional recording/reproducing apparatus as mentioned above.

Another object of the present invention is to provide a new remote control.

Further another object of the present invention is to provide such a new tube face display enabling an operator's easy operation at a time of simultaneously recording and reproducing.

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Further, the conventional recording/reproducing apparatus and remote controlling device (remote control) are not

optimally structured for a recording/reproducing apparatus capable of simultaneous recording and reproducing by using a hard disk or an optical disk and lack an optimum arrangement and display of switches. Therefore, there is a possibility of stopping recording pictures by mistake when stopping playback of video being reproduced.

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A video recording/reproducing apparatus of the present invention, capable of recording an image into a recording medium and reproducing the image from the recording medium, comprises: a recording device for recording video signals and identifying signals indicating the content of the video signals into a recording medium, and a displaying device for reading the identifying signals recorded in the recording medium, rearranging the read identifying signals, and displaying the identifying signals in the order of the rearrangement, and a reproducing device for sequentially reproducing the video signals from the recording medium in the order of the

rearrangement, in which whether there exists a video signal under recording in the recording medium is checked and at completion of the recording of the video signal, video signals to be reproduced are sequentially reproduced.

A video signal recording/reproducing method of the present invention, capable of recording an image into a recording medium and reproducing the image from the recording medium, comprises the following steps of: recording video signals and identifying signals indicating the content of the video signals into a recording medium, and reading the identifying signals recorded in the recording medium; rearranging the read identifying signals, and displaying the identifying signals in the order of the rearrangement; checking whether there exists a video signal under recording in the recording medium; and reproducing the video signals in the order of the rearrangement when there exists no video signal under recording.

A video recording/reproducing apparatus of the present invention, capable of recording an image into a recording medium and reproducing the image from the recording medium, comprises: a recording device for recording video signals and identifying signals indicating the content of the video signals into a recording medium, and a displaying device for reading the identifying signals recorded in the recording medium, rearranging the read identifying signals, and displaying the identifying signals in the order of the rearrangement, and a reproducing device for sequentially reproducing the video

signals from the recording medium in the order of the rearrangement, in which whether there exists a video signal under recording in the recording medium is checked and at completion of the recording of the video signal, video signals to be reproduced are sequentially reproduced.

A video signal recording/reproducing method of the present invention, capable of recording an image into a recording medium and reproducing the image from the recording medium, comprises the following steps of: recording video signals and identifying signals indicating the content of the video signals into a recording medium, and reading the identifying signals recorded in the recording medium; rearranging the read identifying signals, and displaying the identifying signals in the order of the rearrangement; checking whether there exists a video signal under recording in the recording medium; and reproducing the video signals in the order of the rearrangement when there exists no video signal under recording.

A remote control device for a recording/reproducing apparatus according to the present invention is used for a recording/reproducing apparatus capable of recording an image into a recording medium and reproducing the image from the recording medium, in which a recording stop switch for stopping recording video signals and a playback stop switch for stopping playback, provided on a first surface of the remote control device itself, are separated.

A video recording/reproducing apparatus of the



present invention, capable of recording an image into a recording medium and reproducing the image from the recording medium, comprises: a recording device for recording video signals and identifying signals indicating the content of the video signals into a recording medium, and a displaying device for reading the identifying signals recorded in the recording medium, rearranging the read identifying signals, and displaying the identifying signals in the order of the rearrangement, and a reproducing device for sequentially reproducing the video signals from the recording medium in the order of the rearrangement, in which whether there exists a video signal under recording in the recording medium is checked and at completion of the recording of the video signal, video signals to be reproduced are sequentially reproduced.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front view showing an example of an embodiment of a video signal recording/reproducing apparatus of the present invention;

FIG. 2 is a rear view of FIG. 1;

FIG. 3 is a top view showing an example of an embodiment of a remote control device of the recording/reproducing apparatus of the present invention;

FIG. 4 is a partial broken side view of FIG. 3;

FIG. 5 is a partial broken bottom view showing the state of removing the rear cover of the button surface in FIG. 3;

FIG. 6 is a perspective view showing the state of opening the rear cover of the bottom surface in FIG. 3;

FIG. 7 is a plan view showing an example of display;

FIG. 8 is a block diagram showing an example of an embodiment of a video signal recording/reproducing apparatus of the present invention;

FIG. 9 is a diagram for use in describing the present invention; and

FIG. 10 is a diagram for use in describing the present invention.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

Hereinafter, an embodiment of the present invention will be described in detail with reference to the drawings.

FIG. 1 is a front view showing the appearance of a video signal recording/reproducing apparatus of the embodiment. A video signal recording/reproducing apparatus itself 1 has a main power switch 2 on the front surface, and a front lamp 3, lighting up when the power source of the apparatus is turned on, is to show the power-on/off of the apparatus.

Although the conventional video signal recording/reproducing apparatus adopts a display unit which shows the reproducing state and the playback state by a counter, the counter display itself is not suitable in the simultaneous recording/reproducing apparatus using a hard disk and an optical disk as a recording medium, as described later, and it is replaced with the tube face display. If showing the power-

on/off by a lamp of 5 mm diameter, LED, or the like in the conventional way, an operator may confuse it with another lamp or LED, and therefore, use of a lamp on the front surface of the apparatus, long in the longitudinal direction, having a wide illumination area, can prevent the confusion of the lamp with another lamp.

On the front surface of the main body 1, there are a programmed record lamp 4 showing the setting state of the recording by a timer, namely the setting state of the programmed recording, and a program playback display lamp 5 showing that at a time of dubbing video, sound, and the other information recorded in other recording media such as a tape, a semiconductor memory and the like, video, sound, and the other information recorded in a recording medium within the main body are to be reproduced after deciding on a predetermined playback procedure.

This program playback lamp 5 indicates that only a switch used for stopping the playback is workable, of the switches related to the playback of the record, provided on the main body 1 and the remote controller 30 to be described later on.

On the front surface of the main body 1, there are a synchro record button 6 for performing programmed synchro recording with a CS digital broadcast tuner, a tool button 7 for recording, reproducing, and various setting by using the tube face of a monitor and a TV connected to this main body 1, a back button 8, a menu button 9, a list button 10, and common buttons

11, 12, 13, 14, and 15. The common buttons 11, 12, 13, and 14 are used in vertically and horizontally moving a cursor displayed on the tube face, and further they are used for a pause, fast return, fast forward, and stop, of the playback. The common button 15 is used for directing playback and further it is used as a decision button in deciding various setting on the tube face menu.

FIG. 2 is a view showing the rear surface of this main body 1, including a line cord 24 and an outlet 25 for power supply to the other equipment, and further including a VHF/UHF input/output terminal 16 for connecting to an antenna and a TV and a BS-IF input/output terminal 17 used in combination with the VHF/UHF input/output terminal 16 by a branching filter when the antenna is common to VHF/UHF/BS.

Further, the rear surface includes a bit stream input/output terminal 19 and a detection input/output terminal 18 for use in connecting to a BS decoder. This detection input/output terminal 18 is used for connecting a MUSE-NTSC converter together with a decoder AFC input/output terminal 21 and a decoder input terminal 28. Further a converter power switch 29 for turning on/off the power supply to a converter is provided adjacently to it.

It includes input terminals 22 and 27 and output terminals 23 and 26 used for input/output of audio signals and video signals.

FIG. 3 shows the top surface of the remote control 30 used for a remote operation, including a power switch 31 for

turning on/off the power of the video signal recording/  
reproducing apparatus itself 1. The power switches 2 and 31 are  
set so as to turn on/off only a circuit for use in a man-machine  
interface.

On the front surface of this remote controller 30,  
there are a record button 32, a pause button 33, a stop button  
34, a recording monitor button 35, a button 41 for screen  
display and indicating the remaining, and a visual search button  
42, for use in recording, which are not provided on the main  
body 1.

Further, on the front surface of the remote control  
30, apart from the above-mentioned buttons, there are a menu  
button 38, a back button 39, a list button 43, and a tool button  
44 respectively having the same function as that of each button  
provided on the main body 1, and a joystick 47 having the same  
function as that of the buttons 11, 12, 13, 14, and 15 provided  
on the main body 1. The joystick is used for vertically and  
horizontally moving a cursor displayed on the screen by pressing  
in some operational direction and it is also used for pause,  
fast return, fast forward, and stop of the playback. The common  
button 15 is used to direct a playback and to determine various  
settings on the screen.

A program description button 46 is disposed in the  
remote control 30 at a position opposite the buttons related to  
the recording, in the longitudinal direction.

Since the main body 1 is capable of the simultaneous  
recording and reproducing, the button group related to the

recording, in the recording/reproducing apparatus, is disposed at a position different from that of the button group related to the playback on the front surface of the remote control and the both positions are separated, thereby enabling the accurate operation of the recording and the playback. On the other hand, in the conventional recording/reproducing device, for example, a record button and a playback button are disposed adjacently to each other, and this arrangement of the buttons may cause a malfunction when simultaneously operating the record and the playback.

In the remote control 30 of this embodiment, not only the positional relationship of the operation buttons but also the switching mechanism is changed, like the buttons 32, 33, 34, and 35 and the joystick 47, thereby making the operation distinguishable, as well as improving the man-machine interface performance by adopting the joystick mechanism as to the playback function requiring the accurate operation.

As for an instance access, of the functions used for reproducing, no operational ease is needed. Therefore, the buttons 40 and 46 are used for this, and the menu button 38, the back button 39, the list button 43, and the tool button 44 related to the playback function are disposed adjacently to the joystick 47.

On the front surface of the remote controller 30, further there are a channel setting button 36, a quick-view button 37, the screen display/remaining indicating button 41, and the visual search button 42 are disposed between the button

group related to the playback and the button group related to the recording, for separating the both button groups, thereby improving ability of recognition in the button group related to the playback and the button group related to the recording, and further decreasing a possibility of misjudgment.

FIG. 4 shows the arrangement of the buttons for setting a TV, which are provided on the lateral side of the remote controller 30. There are provided a TV power switch 73 for turning on/off the power of a TV, an input switch button 74 for switching an input, a channel +/- button 75 for moving a channel, and a volume +/- button 76 for increasing and decreasing the volume.

As illustrated in FIG. 6, if sliding a rear cover 50 of the remote controller 30 while pressing it, there appears a switch group 51 to 66 such as program setting and the like having been concealed by the rear cover 50, as shown in FIG. 5. A liquid crystal display 67 as shown in FIG. 7 is provided on the rear surface of the remote control, separately from the switch group 51 to 66 concealed by the rear cover 50. The playback and recording functions operated by the buttons (switches) disposed on the front surface of the remote control perform the actual playback and recording of the video signals through the tube face, whereas as for the functions disposed on the rear surface of the remote controller 30 buttons are disposed for the setting related to the timer recording and the G-code recording, which can be set without any display on the tube face. In the case of displaying the reproduced video

signals and the recording screen on a TV monitor connected with the recording/reproducing apparatus, the setting content is displayed on the tube face.

The display unit of FIG. 7 displays a G-code, record mode, a channel to be recorded, recording time, the setting of a TV maker to be operated by the remote control, quick timer, battery consumption, and transfer.

Especially, the battery remaining indicator is necessary for finding the cause of being no operational at a setting time of the remote control, since the display unit is not provided on the recording apparatus itself.

As illustrated in FIG. 5, on the rear surface of the remote controller 30, there are a channel +/- button 51 for a built-in tuner, a transfer button 52 for transferring various settings to the main body, a record mode button 53, a cancel button 54 for canceling the settings, a numeric button 55 corresponding to the numerals from one to nine, a return/correction button 56 serving for moving a cursor and accepting correction at a time of setting, an input switch button 57 for switching an input, a quick timer button 58 for increasing the recording time by every 15 minutes, a sound switch button 59 for switching the sound at recording, a G-code program button 60 for programming by G-code, an image quality setting button 63 for setting the image quality, a remote control setting button 64 for switching a corresponding TV maker, an index write/cancel button 65 for setting cancellation and index writing for use in search for a recorded image, and a battery remaining indicator



66 for displaying the state of battery, and the above mentioned numeric button 55 serves as a set-up button 61 for use in displaying various settings on the tube face and a decision button 62 for instructing the decision of the moving direction of a cursor to the main body.

FIG. 4 shows the arrangement of the buttons for setting a TV, which are provided on the lateral side of the remote controller 30. There are provided a TV power switch 73 for turning on/off the power of a TV, an input switch button 74 for switching an input, a channel +/- button 75 for moving a channel, and a volume +/- button 76 for increasing and decreasing the volume.

As shown in FIGS. 3 to 5, in the remote controller 30 of the embodiment, the setting functions are divided on the front surface, the rear surface, and the lateral surface, respectively, for the main operation for use in recording and reproducing, the auxiliary operation for auxiliary use in recording and reproducing, and the TV operation. Additionally, the recording function and the playback function are provided on the same surface but separated at a distance, thereby preventing malfunction of operations to a degree. These are important functions in the recording/reproducing apparatus capable of simultaneously recording and reproducing.

FIG. 8 shows a recording/reproducing circuit of the recording/reproducing apparatus itself 1 of the embodiment.

Video signals and audio signals entered through a ground wave tuner 80 are respectively supplied to an AD

converter 82 and a YC separation filter 83 through a first input switch 81.

The YC separate luminance and color-difference signals are supplied to an NTSC decoder 85 through a second input circuit 84 switching signals from an outward input S terminal, and as for the synchronous component, the decoded signals are supplied to a synchronous control circuit 86 and as for the video component, to a pre-video signal processing circuit 88.

A part of the video signals subject to the pre-video signal processing is supplied to the reproducing circuit, for display of the recorded image, while it is supplied to an MPEG video encoder 89, for recording.

The NTSC decoder 85 extracts the broadcast schedule which a specified broadcast channel is delivered on a video signal, information relative to a program based on the schedule, and the time information thereof, so as to decode and transfer the same to the system controller 100. The time information is used for setting the current time after it is transferred to a timer within the system controller 100. The time information is used for programmed recording, based on the time within the timer and the broadcast schedule, within the system controller 100.

For example, the video recording/reproducing apparatus of the embodiment can judge the end time of video under the programmed recording actually, by comparison between the time of the timer and the broadcast schedule.

The broadcast schedule includes: a program code; the time relative to all the programs of ground wave broadcast and satellite broadcast BS and CS; a channel; the type of the ground wave broadcast or the satellite broadcast; and G code corresponding to a channel and title, and the information relative to a program includes: a program code corresponding to the broadcast schedule; title; brief extract from the content; the type code relative to a program; a performer; and special information. The type code (classification) indicating the content of each program, broadcast date, and title are used for rearrangement of each list in a program list display (list) as described later.

After the AD conversion, audio signals are supplied to the MPEG audio encoder 87, and combined with the output of the MPEG video encoder 89, they are multiplexed in a time sharing way and recorded. The time division multiplex and separate circuit 91 is connected to a bit stream input/output terminal 19 that is the outward digital interface input/output terminal, through a digital interface 90, in order to directly store the digital signals entered from the outward, in addition to the output of the MPEG video encoder 89 and the output of the MPEG audio encoder 87.

The system controller 100 records the information relative to a program to be recorded (identifying signal) into a specified area of the recording medium 93, in accordance with recording a video signal (program) into the recording medium (hard disk) 93, and the recorded information on the program is



a user to confirm whether a key should be set or released.

The time division multiplex and separate circuit 91 supplies the signals to a buffer control circuit 92 which performs input/output to and from a hard disk 93, so to store them into the hard disk 93.

The hard disk 93 is controlled by the buffer control circuit 92, and it can be replaced by an optical disk having the same structure. Assuming that the recording and playback speeds of video are respectively 10 Mbps, since a speedy optical disk works at a speed of 40 Mbps, the simultaneous recording and reproducing is possible in addition to the easy recording and reproducing, even if considering the time of retry.

The playback signals reproduced by the time division multiplex and separate circuit 91 are supplied to the MPEG AD encoder 94, where the video and audio signals are respectively decoded.

The MPEG AV decoder 94 switches between the output for tube face display from the pre-video signal processing unit 88 and the output of the MPEG AV decoder 94, or mixes them in a time sharing way, hence to supply the same to an OSD circuit 96.

The signals supplied from the OSD circuit 96 are decoded into signals that can be displayed by a TV for NTSC, by a TNTSC decoder 97, and thereafter, they become the signals that can be displayed on the screen. For example, the reproduced image and the image to be recorded can be displayed within respective windows on the same screen.

As in the case of the audio signals, signals for

recording the audio signals and the output of the MPEG AV decoder 94 are supplied to a DA converter 99 through the switching circuit 98.

Since the digital signals entered from the outward are premised on the MPEG TS method, in the video signal recording/reproducing apparatus itself 1 of this embodiment, the audio and video signals, after their MPEG encoding, are not recorded and controlled separately but controlled by the recording medium according to the TS method.

FIG. 9 shows the playback title screen displayed on the screen of a TV in reproducing the video recorded by the video signal recording/reproducing apparatus itself 1 of the embodiment.

By pressing a list button on the front surface of the remote controller 30, the playback title screen can be displayed on the screen. In the displayed list 105, a playback list, a time-scheduled program list, a CH-classified program list, a type-classified program list, my channel, and a preset program list can be selected from a list menu displayed on the same screen.

The playback list is to display programs recorded in the recording/reproducing apparatus, and the respective program lists classified by time, CH, and type are a program schedule sent in a lump through a specified CH broadcast, which is broadcasted on a different channel from the programs, and lists created by editing the contents of the respective programs from the text and program classification.

My channel is to display a user's favorite classification and content by extracting it from the past record information and selecting it from the program schedule, text, and program classification. A list 105 shown in FIG. 9 is a playback list selected from the list selection and the list shows the selection buttons of NEW sort 106, date sort 107, title sort 108, and classification sort 109. By selecting one of these buttons while moving a cursor, the corresponding sort is selected and performed according to the flow as shown in FIG. 10.

Based on the data multiplexed in the broadcast program, various kinds of lists are displayed and sorted. Therefore, not only data error can be detected so that the data error can be corrected, but also, in accordance with the majority rule, an error may be judged by a majority of data sent in the past, so that the correct data may be extracted.

The NEW sort 106 is to sort the titles of the recorded images which have been automatically recorded by a timer in the video signal recording/reproducing apparatus 1 but yet to have been reproduced yet, in the order of recording. They can be sorted out also in the order of date, title, and index mark set by the remote control 30.

The sorted titles can be automatically reproduced by the playback, and further the beginnings of the recorded images for every one minute can be reproduced by turns by specifying the intro playback. The playback time of this intro playback can be varied freely by an instruction from the remote

controller 30.

Pressing the menu button 38 of the remote control 30 can show a window on a list display with buttons (not illustrated) for various reproducing methods on the tube face. These buttons include a sequential playback button, intro playback button, skip playback button, and shuffle playback button.

The rearranged titles can be automatically reproduced by selecting the sequential playback button by a cursor on the tube face or pressing the playback button 47 of the remote control. Further, the beginning of each recorded video can be sequentially reproduced for every one minute by selecting the intro playback button by a cursor on the tube face to specify the intro playback. The reproducing time of this intro playback can be freely changed by increasing and decreasing the numeric displayed on the tube face according to an instruction from the remote control 30.

Since the thumbnail images are prepared correspondingly to the initial screens of the respective titles, after sorting the titles, the thumbnail display can be specified by once more pressing the list button 43 twice continuously, and the thumbnail images can be displayed in the order of the titles.

The video recording/reproducing apparatus of this embodiment adopts a recording medium by use of a hard disk or an optical disk, differently from the conventional tape recording/reproducing apparatus, for example, VTR, thereby enabling





modifications can be effected therein by one skilled in the art without departing from the spirit or scope of the present invention as defined in the appended claims.

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